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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,354	10/17/2003	Ford B. Grigg	2269-5216.1US (99-0507.01)	2306
24247	7590	08/23/2005	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			WILSON, CHRISTIAN D	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/688,354

Applicant(s)

GRIGG ET AL.

Examiner

Christian Wilson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>06/32/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yaguchi *et al.* in view of Kong.

Regarding claim 1, Yaguchi *et al.* (WO 97/01865) teaches a semiconductor device assembly [Figure 18G] comprising a carrier substrate **14**, a first contact area **3** on the surface and at least one opening [Figure 18B], and solder mask **8** over at least a portion of the surface of the carrier substrate where the solder mask includes at least one opening through which the opening of the carrier and the contact area are exposed [Figure 18B]. Yaguchi *et al.* does not discuss a carrier substrate comprising an insulating material. Kong (US 5,920,118) teaches an insulating carrier substrate **21**. It would have been obvious to one of ordinary skill in the art to use the insulating carrier substrate of Kong in the device of Yaguchi *et al.* since this substrate provides reduced package thickness and improved productivity.

Regarding claim 2, Yaguchi *et al.* further teaches a semiconductor die **1** including a bond pad **2** to an opposite surface of the carrier substrate with the bond pad exposed through the opening in the solder mask and carrier substrate [Figure 18B].

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Regarding claim 3, Yaguchi *et al.* further teaches an intermediate conductive element 5 between the bond pad and contact area.

Regarding claim 4, Yaguchi *et al.* further teaches a thickness of a solder mask which exceeds the height of the intermediate conductive element which protrudes above the carrier substrate [Figure 18C].

Regarding claim 5, Yaguchi *et al.* further teaches an encapsulant material 11 within the opening of the carrier substrate and solder mask.

Regarding claim 6, Yaguchi *et al.* further teaches an upper surface of the encapsulant material is level with the outer level of the solder mask [Figure 18E].

Regarding claim 7, Yaguchi *et al.* further teaches a distance between an uppermost portion of the intermediate conductive element and the outer surface of the solder mask is at least 25 μm [pg. 16, line 15 – pg. 17, line 10].

Regarding claim 8, Yaguchi *et al.* further teaches a bond wire and a thickness of the solder mask is equal to the sum of a distance a portion of a loop of the bond wire protrudes above the surface of the carrier substrate and about 25 μm [pg. 27, lines 3-12].

Regarding claim 9, Yaguchi *et al.* further teaches a conductive trace electrically connecting the first contact area and the second contact area [pg. 16, lines 1-10].

Regarding claim 10, Yaguchi *et al.* further teaches a second contact area 6 is exposed through an aperture of the solder mask.

Regarding claim 11, Yaguchi *et al.* further teaches a discrete conductive element protruding from the second contact area above the solder mask [Figure 18F].

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Regarding claim 12, Yaguchi *et al.* further teaches at least half the height of the discrete conductive element protrudes above the outer surface of the solder mask [Figure 18G].

Regarding claim 13, Yaguchi *et al.* further teaches a solder mask and carrier substrate with substantially the same coefficient of thermal expansion [pg. 21, lines 20-25; pg. 27, lines 5-10].

Regarding claim 15, Yaguchi *et al.* further teaches a solder mask with a thickness of 50 μm to 100 μm [pg. 27, lines 3-12].

3. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yaguchi *et al.* and Kong as applied to claim 1 above, and further in view of Matsumura *et al.*

Yaguchi *et al.* as modified by Kong teaches the limitations of claim 1 as described above but does not teach the a solder mask comprising a cured photoimageable material. Matsumura *et al.* (US 5,181,984) teaches a solder mask comprising a photoimageable material 2. It would have been obvious to one of ordinary skill in the art to use the material of Matsumura *et al.* in the device of Yaguchi *et al.* since this material provides a solder mask that does not have air spaces which would allow solder to invade below the mask [column 1, lines 35-40].

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

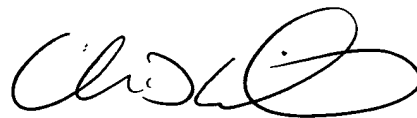
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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886. The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2800.



Christian Wilson, Ph.D.
Primary Examiner
Art Unit 2891

CDW